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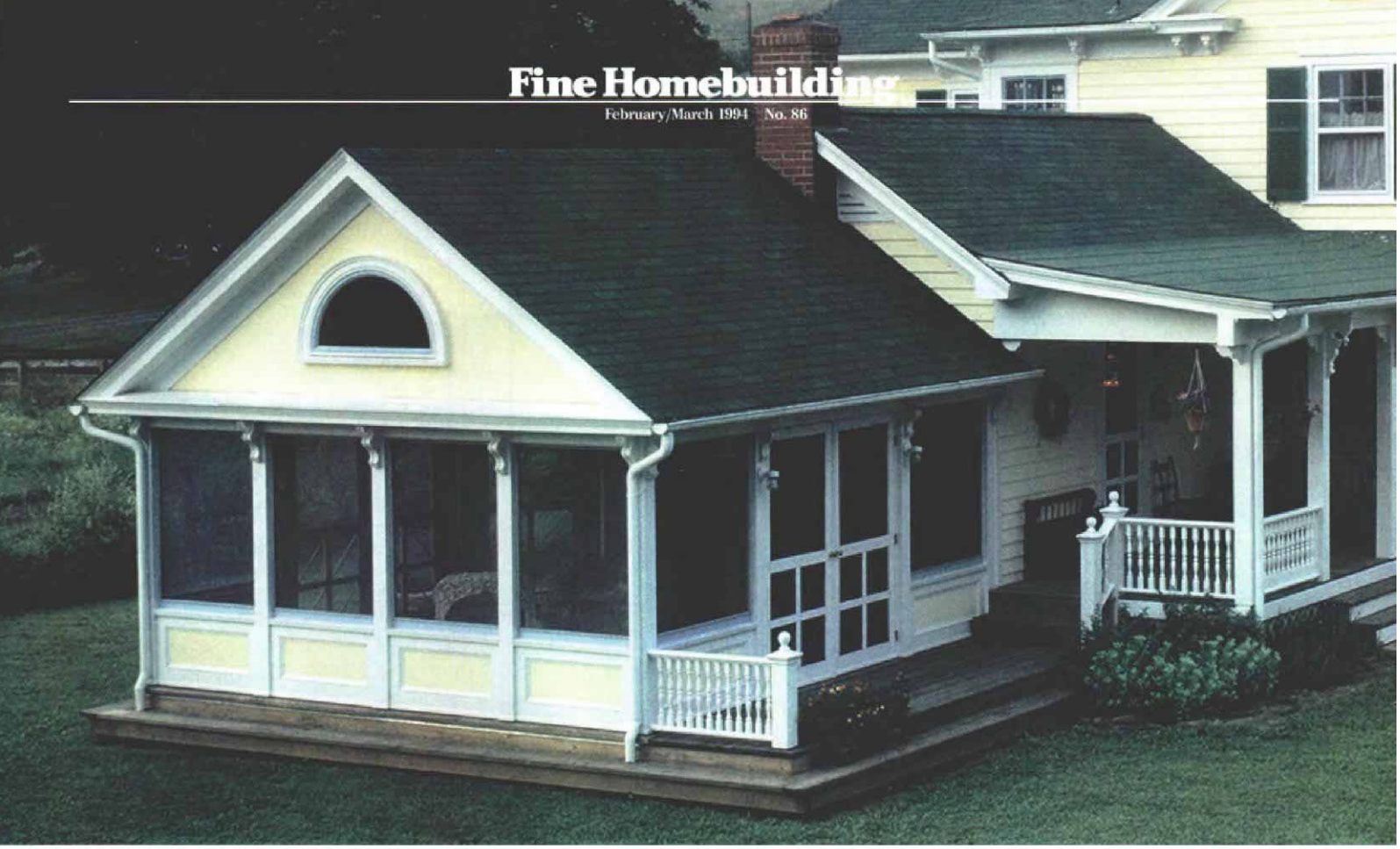
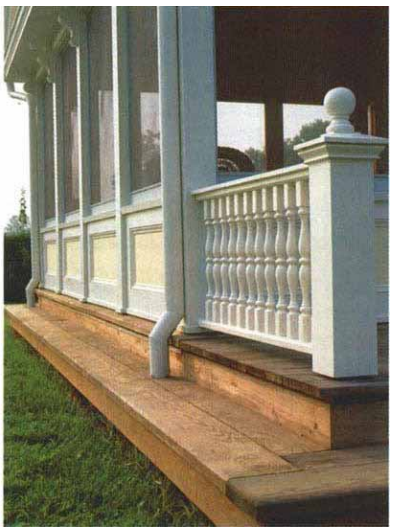


A place to kick back and relax. **The screen porch the author built on his own house combines Victorian detailing with a builder's considered construction methods. In the photo below, a single pressure-treated step runs all the way around the outside of the porch as a sort of plinth.**

A Builder's Screen Porch

From a hip-framed floor that slopes in three directions to a coffered ceiling, a veteran carpenter builds his porch his way



by Scott McBride

My grandfather lived alone in a little bungalow by the seashore. We got to know each other in his final years by spending long summer evenings out on the screen porch. We talked about the many things the old man had done in his life and some of the things a young man might do with his. Sometimes we didn't talk at all—just listened to the waves and the pinging of the June bugs off the screen, watched the lights, smelled the breeze.

A screen porch at night can have a magic all its own, balancing as it does on the cusp between interior and exterior space. A porch offers just enough protection from the elements to foster relaxation and reflection, without shutting out the sounds and the smells of the cosmos. This dual nature of screen porches can make them difficult to build with style because the usual rules of interior and exterior construction often overlap in their design.

When the time came to build a screen porch on my own house here in Virginia (photo above), I had the luxury of time—no anxious client, no deadline and no hourly wages to worry about. So I included lots of special details that I hope will spare my porch some of the

Bottom photo: Jefferson Kolle

problems I've seen in 20 years of remodeling other people's houses.

The foundation—I sited my screen porch two risers up from grade and three risers down from the adjacent kitchen. This made a smooth transition to the yard without requiring too much of a descent when carrying an armful of dinner plates from the kitchen. To anchor the structure visually, I ran a continuous step of pressure-treated lumber around the perimeter as a sort of plinth (bottom photo, facing page).

The step is supported by pressure-treated lookouts that cantilever off the poured-concrete foundation (top photo, right). I used pressure-treated 2x6s for the lookouts, inserted them into my formwork and actually poured the concrete around and over them. There isn't much concrete above the lookouts, so to key each lookout into the mix, I nailed a joist hanger on both sides. A week after the pour, the projecting lookouts were rock solid.

A hip-framed floor—Masonry is the obvious choice for the floor of a screen porch because water blowing through the screens won't affect it. Also, in hot weather the coolness of a masonry floor feels good on your bare feet. On the downside, masonry is, well, hard. It's also difficult to keep clean, it's gritty underfoot, and it retains moisture in damp weather.

Open decking is a good alternative to masonry, as long as it's screened underneath to keep the bugs out. Spaced, pressure-treated yellow pine will make a good, serviceable floor, and having a roof overhead will protect the floor from the harsh sun that is the nemesis of pressure-treated lumber. But open decking looks utilitarian at best, and my wife and I wanted something a bit more refined.

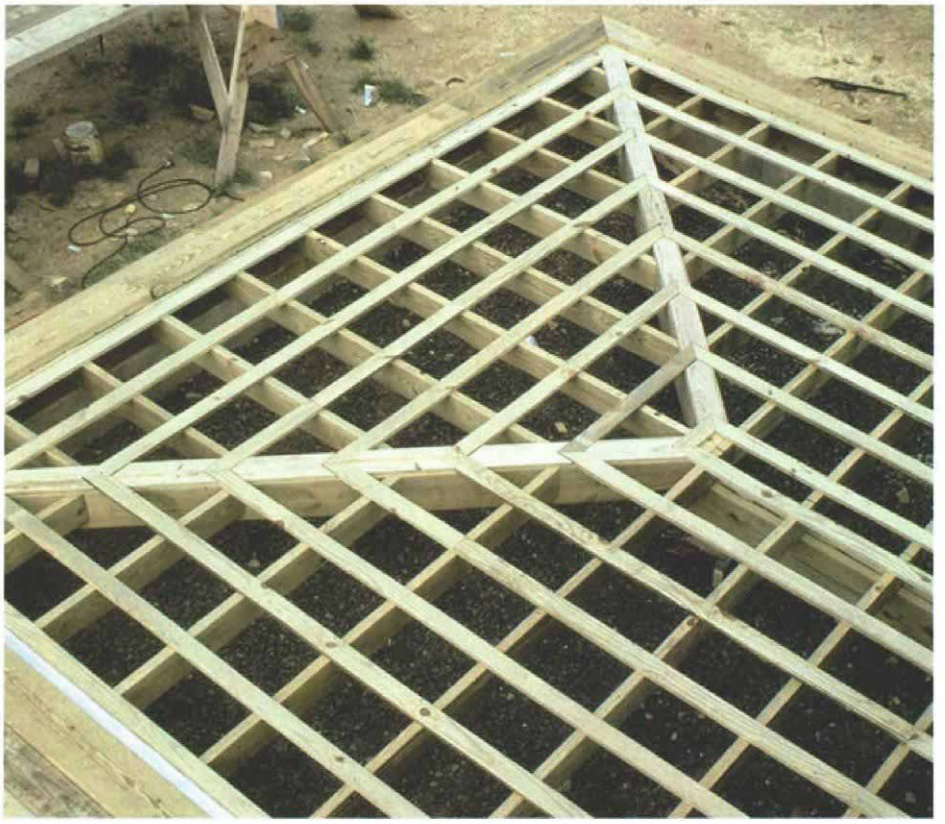
I decided to use untreated kiln-dried yellow-pine flooring, bordered by a coping of treated 2x8 (middle photo, right). I have repaired a lot of old porches, and I have noticed that it's the outer ends of the old floors that eventually decay while the wood stays sound just a foot or so in from the drip line of the eaves. By bordering my floor with a treated coping, the untreated yellow-pine flooring would be recessed further under cover. Also, the coping would allow me to lay the tongue-and-groove (T&G) floor at the end of the job because the structure above—the roof and its supporting columns—bears on the coping, not on the flooring. A temporary plywood floor endured weather and foot traffic during construction and allowed me easy access to run wires in the 1-ft. deep crawlspace.

To ensure positive drainage, and to avoid standing water on the T&G floor I had decided to use, I pitched the floor ¼ in. per ft. from its center in three directions. This meant that I'd have to frame the floor like a shallow hip roof (bottom photo, right). What became the ridge of the floor framing was supported by concrete piers.

I ran 1x strapping perpendicular to the joists and eventually laid the flooring over the strapping. In addition to promoting good air circulation under the flooring, the strapping served two other purposes: It allowed the flooring to run

Thinking ahead. **Lookouts embedded in the concrete (and held securely by the addition of a joist hanger nailed to each side) provide rock-solid support for the first tread of the step that runs around the porch's perimeter.**

Coping with weather. **A coping of pressure-treated 2x8s supports the porch posts. Weep channels in the coping and an aluminum pan divert rainwater blown through the screens.**



Get hip. **This floor system, which is framed like a shallow hip roof, allows water to run off the porch floor. Strapped joists bring the finish floor flush with the 2x8 coping.**

parallel to the slope so that most of the water would flow by the joints in the flooring rather than into them. The strapping also brings the top of the 1x flooring flush with the 2x coping. I could have used pressure-treated 1x for the coping, but because the roof and its supporting posts rest on the coping, I wanted it to be substantial.

The joint between the ends of the flooring and the inside edge of the coping gave me pause. I knew that wind-driven water was likely to seep in here and be sucked up by the end grain of the flooring, leading to decay. I thought about leaving the joint intentionally open, say ¼ in., but I knew that such a gap would collect dirt and be an avenue for critters. Instead, I back-cut the ends of the floorboards at a 45° angle and let them cantilever a couple of inches past the strapping for good air circulation underneath. Meanwhile, the long point of the mitered end butts tightly to the coping.

To collect any water that might seep through the joint, I formed aluminum pans that run underneath the coping and lip out over the floor framing (middle photo, p. 37). I cut weep channels in the underside of the coping with a dado head mounted on my radial-arm saw to let water out and air in. I have since heard that aluminum reacts with the copper in treated wood, so I probably should have used copper for the pans.

Hollow posts and beams—The roof of a screen porch is generally supported by posts and beams rather than by walls. Solid pressure-treated posts work well for support, but they won't accommodate wiring or light switches. Solid posts also are prone to shrinking, twisting and checking.

I made hollow posts of clear fir, joining them with resorcinol glue. Biscuits provided registration during glue up (middle drawing, right). I rabbeted the sides of the posts to receive both the frames for the screen panels and the solid panels below the screens. The bottom of each post was rabbeted to house cast-aluminum post pedestals. The pedestals keep the bottoms of the posts dry. They also allow air to circulate inside the posts to dry up any internal condensation. Rabbeting the pedestals into the posts makes them almost invisible and ensures that all rainwater is carried safely down past the joint between the pedestal and the post.

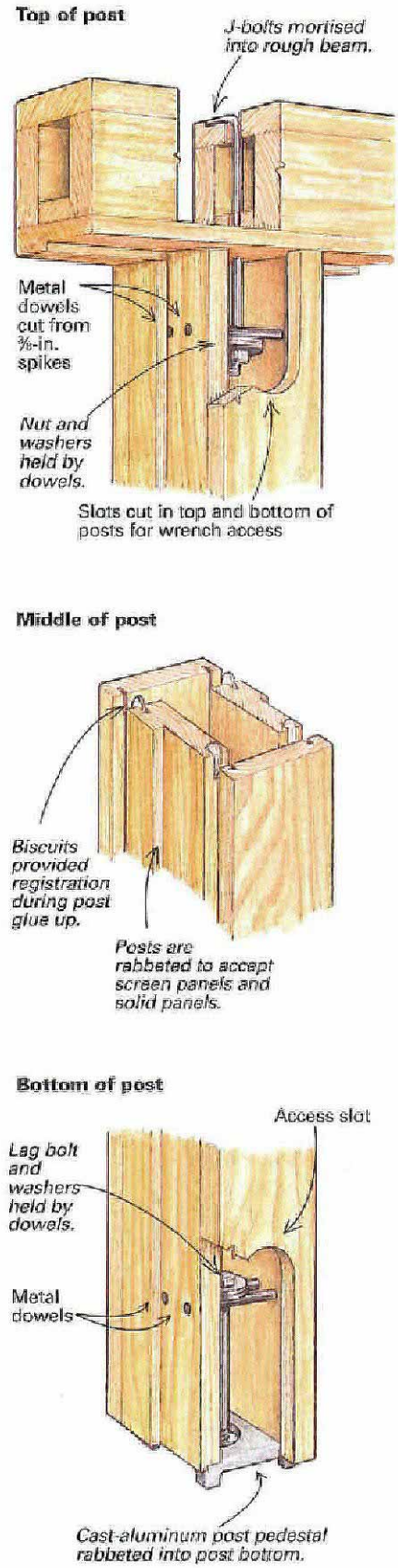
Because the 2x8 coping on which the pedestals bear is pitched (because of the hipped floor framing), I used a stationary belt sander to grind the feet of the pedestals to match.

Inland Virginia where I live doesn't get the wind of the Florida coast, but we get plenty of gales, and last year a tornado ripped the roof off a Wal-Mart in another part of the state. To provide uplift resistance for my porch roof, I bolted the tops and bottoms of the posts in place. Rather than relying on weak end grain to hold the bolts, I ran horizontal pairs of steel dowels through the posts, 3½ in. from the top and the bottom (top and bottom drawings, right). The dowels were hacksawed from ⅜-in. dia. spikes. At the bottom I passed *a* lag bolt vertically between the dowels and screwed it down into the floor framing until the head of the lag came to bear against the dowels (bottom drawing, right). At the top I used a similar arrangement, but instead of lag bolts, I used inverted J-bolts with the foot of the J mortised into the top of the rough beam, and the threaded end passing between the dowels. To get at the bolts with a wrench, I cut slots on the interior sides of the posts, which would be covered later with base and capital trim. I was surprised how rigid the posts felt after being bolted upright, even before they were tied together at the top.

The rough beams were made up with a box cross section rather than simply doubling up 2xs on edge (drawing p. 40). This gave the beam lateral as well as vertical strength so that any unresolved thrust loads from the untrussed secondary rafters above would be resisted by the horizontal top plate in the beam.

Porch posts: construction and attachment details

To prevent uplift from strong winds, the hollow posts are bolted at the bottom to the 2x8 coping, and at the top to the rough beam.



The roof and the ceiling—The inspiration for the coffered cathedral ceiling came from several sources. I once watched Japanese carpenters raise the frame of a small farmhouse. The delicate grid of the peeled white timbers against the sky made a lasting impression. I've also worked on Victorian houses in the Hudson Valley that featured finely wrought coffered ceilings over their verandas.

The framing scheme I finally decided upon is one that's found in some New England timber frames: trussed pairs of principle rafters interspersed with lighter, untrussed secondary rafters (middle right photo, facing page).

Instead of using heavy timber, I laminated each principle rafter in place from a 2x6 sandwiched between two 2xl0s. Offsetting the bottom edge of the 2x6 helped disguise the joints, and the hollow channel above the 2x6 was useful for wiring.

Collar ties connecting principle rafter pairs have a 2x6 core sandwiched between 1x8s. The ¾-in. thickness of the 1x8 avoids an undesirable flush joint at the end where it butts into the rafter.

The secondary rafters are as wide as the principle rafters at the base, but their lower edges immediately arch up into a curve that reduces their width from 9 in. to 5 in. The constant width of all the rafters at the base allows the bird's mouth and frieze-block conditions to be uniform, even though the rafter width varies. I roughed out the curve of the secondary rafters with a jigsaw, then trimmed them with a flush-trim router bit guided by a template (top right photo, facing page).

Short 2x4 purlins span between the rafters on approximately 2-ft. centers (middle right photo, facing page). The ends of the purlins are housed in shallow pockets routed into the rafters, also with the help of a plywood template. I fastened the purlins with long galvanized screws.

The roof-framing material was selected from common yellow-pine framing lumber. Before I remilled the lumber, I stickered it and covered it with plywood for two months to let it dry.

The roof was sheathed with 2x6 T&G yellow pine run vertically, perpendicular to the purlins. The exposed V-joint side faces down, and the flush side faces up. Running the boards vertically added to the illusion of the porch's interior height; it was a pain in the neck to install because I had to maneuver from the eaves to the ridge while nailing each piece. To facilitate

Drawings: Bob Goodfellow

Yellow pine and Douglas fir **complement one another on the interior of the porch. The rafter system, the vertical roof sheathing and the flooring are all yellow pine while the posts and the panels are Douglas fir.**

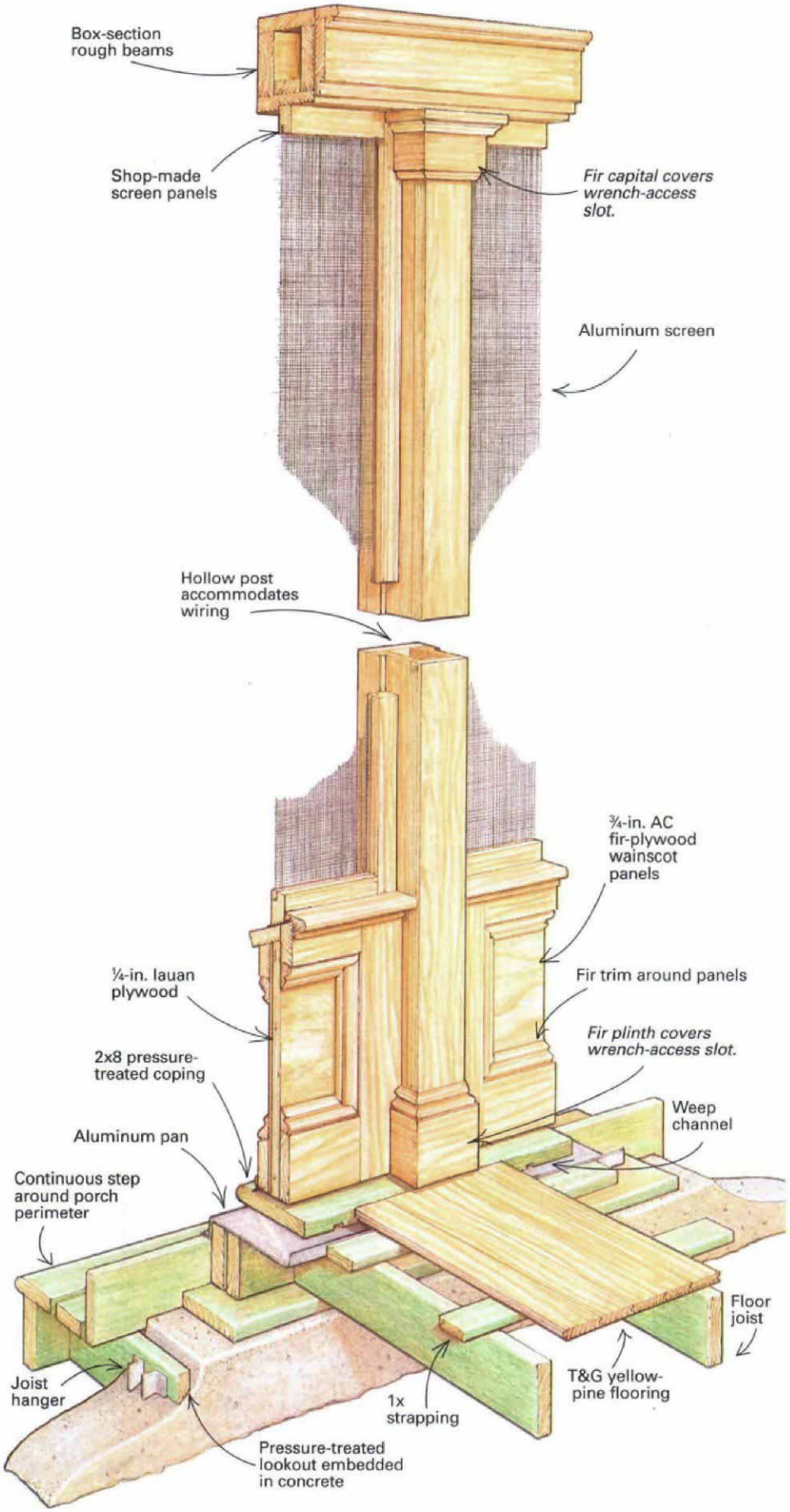
Curved secondary rafters. **To create the curves on the bottom edge of the secondary rafters, the author first rough cut the edges with a jigsaw, then trimmed them using a template and a router fitted with a flush-trim bit.**

Primary and secondary rafters **combined with a series of purlins comprise the porch's roof system. The secondary rafters curve along their bottom edges to reduce their width from 9 in. to 5 in. The purlins are let into the rafters and secured with screws.**

Cluck, cluck, cluck. **The author used a chicken ladder—a narrow set of stairs built on site—to ease the task of installing the vertical sheathing that runs from the eaves to the ridge.**

Floor framing and post details

The porch is supported by a series of hollow posts. Plywood wainscot panels provide lateral rigidity. The wainscot panels and the shop-made screen panels fit into the rabbets cut into the posts.



the process, I built a chicken ladder—a narrow staircase that hooks over the ridge and runs down to the eaves (bottom photo, p. 39).

Building a structure with an exposed finished frame was difficult and time-consuming. Floor space in my shop was strained to the max while all the components were fabricated. Everything had to be given multiple coats of a water-repellent finish to prepare it for the eventuality of rain before I could dry in the structure—I used Olympic WaterGuard (PPG Industries, Inc., One PPG Place, Pittsburgh, Pa. 15272; 412434-3131). Moving ladders and scaffolding around all that finished woodwork was harrowing. The payoff, though, was a structure with a kind of bare-bones integrity that would have been hard to achieve with the conventional approach of rough framing wrapped with finish material.

Finish details—To contrast with the yellow pine in the ceiling and the floor, I used fir for all the woodwork from the floor up to the interior frieze (left photo, p. 39). The choice of fir allowed me to order matching stock screen doors, and this saved a lot of time in the shop. To reinforce the doors against racking, I introduced slender diagonal compression braces into the doors' lower screen panels.

The structure itself gains much-needed shear strength from the wainscot below each screen panel. The wainscot has no interior framing: It is built up with plywood and trim boards. First I screwed ¾-in. AC fir plywood panels to the posts, good side in. I bedded the panels into the same rabbets that would receive the screen frames above the wainscot. I then attached 5/4 fir rails and stiles to the inside face of the fir plywood. To avoid exposed nail heads, I screwed through the back of the panel to catch the trim.

On the outside, I tacked a sheet of ¼-in. lauan over the back of the AC plywood. Lauan holds up well in exterior applications and takes a good paint finish. The stiles and the rails on the outside were nailed through both layers of plywood into the interior stiles and rails. The resulting sandwich proved remarkably stiff. I capped the panels with a beveled sill and a rabbeted stool. For drainage, the bottom edge of the wainscot was raised 1 in. above the floor coping. To keep bugs out, I stapled a narrow skirt of insect screen around the outside. The top of this skirt was clamped down with a thin wooden band. A similar condition was achieved at the doors by attaching sweeps of insect screen. I even weatherstripped the edges of screen doors using a compressible-rubber weatherstripping (see *FHB* #78, pp. 92,94).

When it came time to lay the T&G floor, I pondered the best way to deal with the shallow hips where the pitch of the floor changes direction. Rather than have a continuous 45° joint, which would be prone to opening up and collecting dirt, I decided to weave the floorboards in a herringbone pattern (top photo, facing page). Working from the longest boards out to the shortest, I grooved the end of each board so that it would engage the leading tongued edge of its neighbor. To cut the end groove, I used a ¼-in. wing cutter chucked in a router (bottom photo,

right). The result is a pleasing stepped pattern that is accentuated by the way sunlight bounces off the wood according to the grain direction and the different planes of the hipped floor. Depending on where you stand, the floor has almost a faceted look; one side of the hip looks darker than the other.

Outside, I finished the porch with details consistent with my late 19th-century house. I extended the cornice return all the way across the gable by cantilevering lookouts off the gable studding. This creates a full pediment and gives the porch's gable end the same overhang protection as its eaves. The tops of the posts sport scroll brackets on the outside and simple capitals on the inside.

Screen for the porch—I made wood frames for my porch screens out of 1x2 fir. I used mortise-and-tenon joinery with an offset shoulder on the rails. The strength of a mortise-and-tenon joint isn't really necessary for a fixed frame that gets fully supported in a larger structure. But the design of a mortise-and-tenon joint makes it easy to use a table saw to cut the rabbets and plow the spline grooves before assembling the frame.

Spline stock holds the screen in the frame. Tubular in cross section, the spline stock gets pushed into a groove on the frame where its compression holds the screen in place. Spline stock is made from rubber or vinyl, and it's available in a smooth profile or with ridges around the circumference. The ridges help guide the splining tool, and they give the spline a little more bite on the walls of the groove.

The tool used to press in the spline looks like a double-ended pizza cutter. One disk has a convex edge used initially to crease the screen into the groove. The other disk has a concave edge, which tracks on the round spline as it is pressed into the groove.

The two most common types of screen are aluminum and vinyl. Aluminum screen is available in mill finish or charcoal (see *FHB* #54, p. 4, for a source of screen made of copper, stainless-steel, bronze, etc.).

I used mill-finish aluminum for my screen porch because it seemed to be the most transparent. I also think aluminum is somewhat stronger than vinyl and less likely to sag over wide spans. The main drawback of aluminum is oxidation, which gradually forms a grainy deposit on the wire and reduces the screen's transparency. I live in a rural inland area where salt and pollution aren't prevalent. If I lived near the sea or in an urban environment, I would have leaned toward vinyl. I would also go with vinyl if I were hanging the screen in place vertically, rather than rolling it out on a bench. Vinyl is much easier to work with and less likely to crease. A final consideration in choosing screen is the resounding ping made by bugs slamming into a tightly stretched aluminum screen. I rather enjoy it—it's one of the unique sounds of summer—but others might prefer to muffle the impact by using the softer vinyl screen. □

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The hipped floor **slopes in three directions to shed water that blows through the screens (above). Sun hitting the finished floor gives a pleasing effect. The joists are cross-strapped, and the flooring is laid on the strapping so that it runs parallel to the slope of the porch floor. A router grooved the end of each piece of flooring (below) so that it could herringbone its way down the floor's hips.**

Top photo: Jefferson Kolle